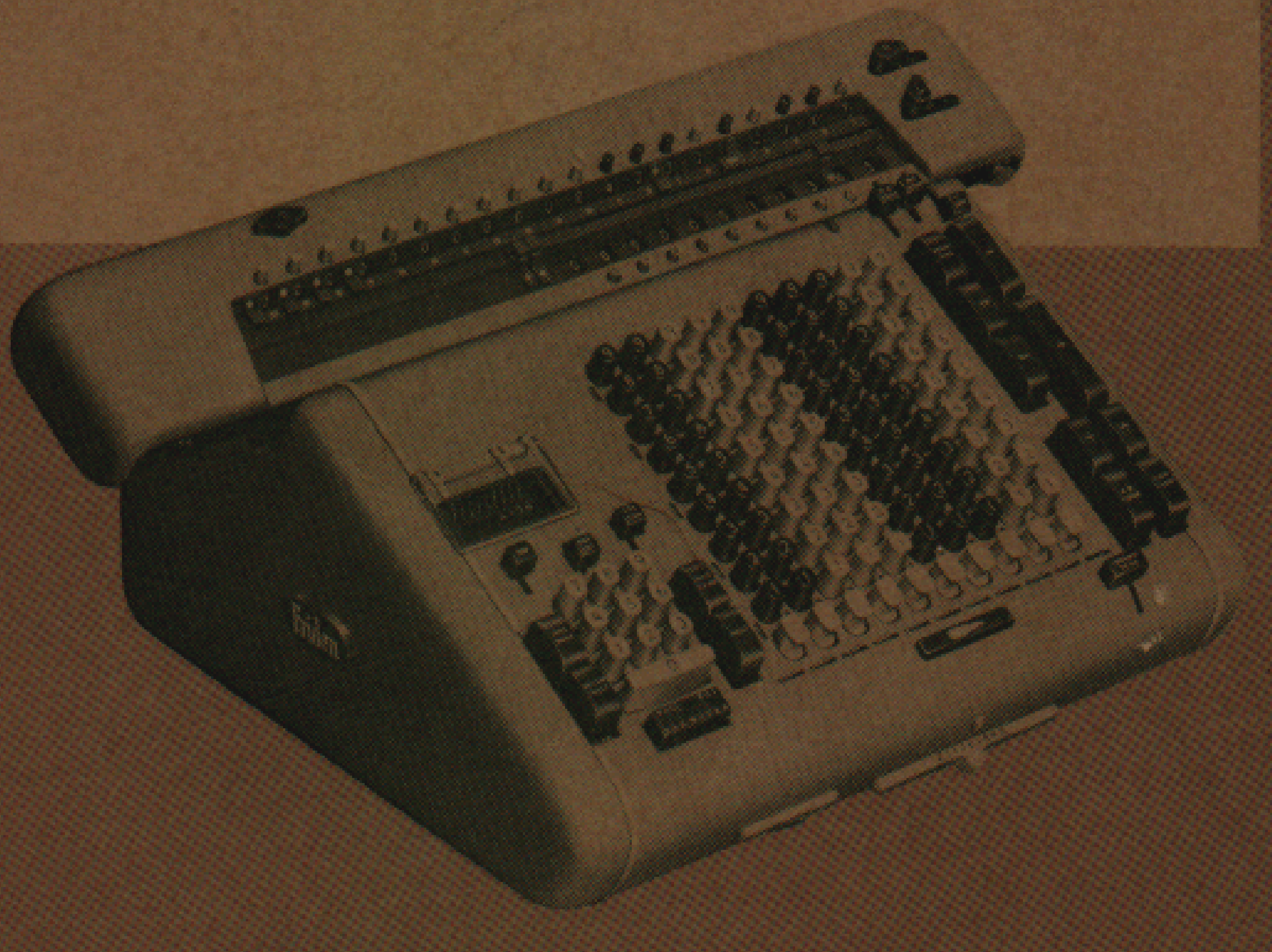
OPERATING INSTRUCTIONS

for model SBT FRIDEN CALCULATOR



Friden Creates
A New World
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Friden, *Inc.*
SAN LEANDRO • CALIFORNIA

Operating Instructions
for
Model SBT
Friden Calculator

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FRIDEN, INC.
San Leandro, California

The text of this booklet was set up
on the Friden JUSTOWRITER, the automatic
tape-operated composing machine.

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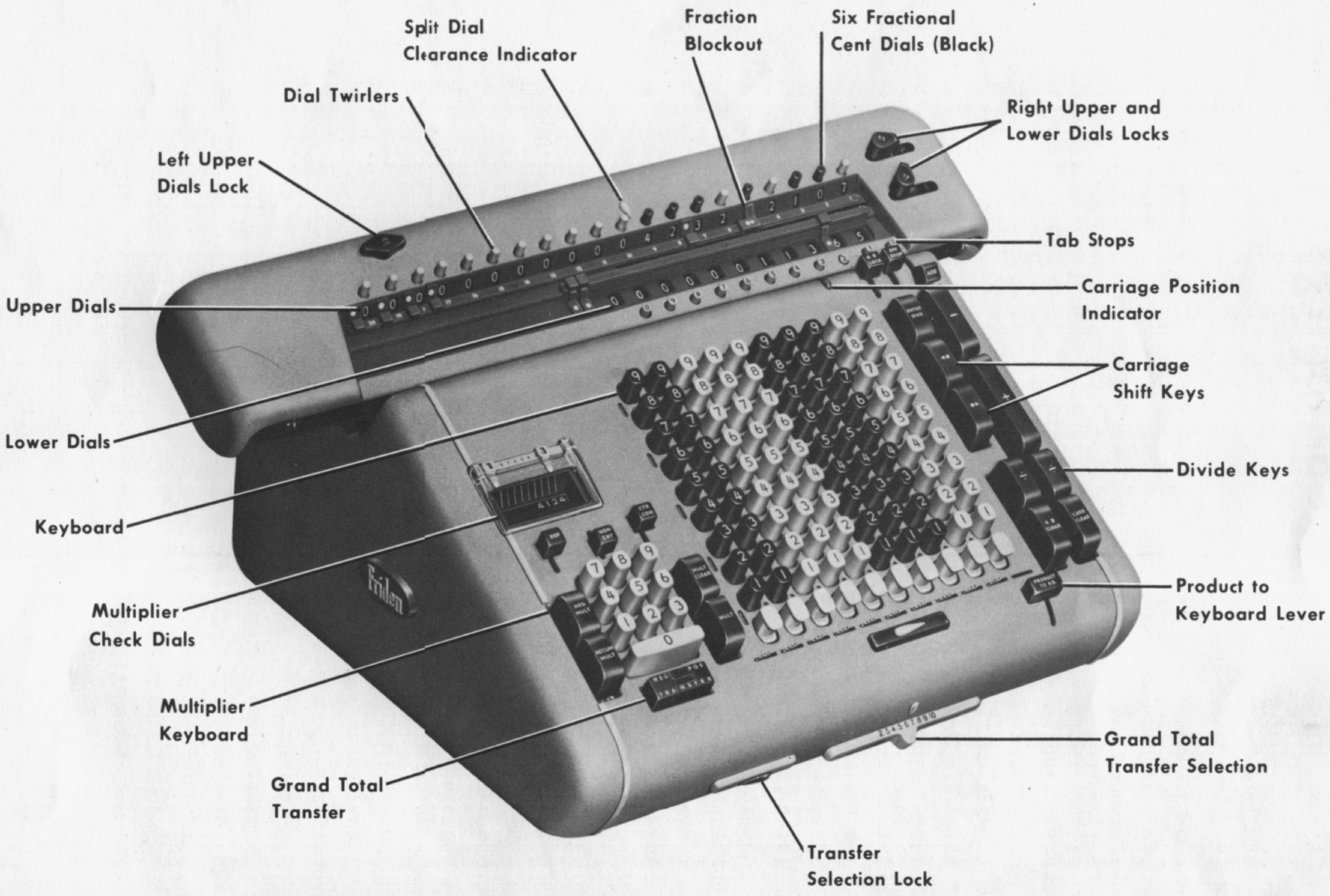
FRIDEN FULLY AUTOMATIC CALCULATOR, MODEL SBT



THE MODEL SBT

HOW IT WORKS

The Friden Calculator performs multiplication or division by a process of high-speed addition or subtraction. A number set on the large Keyboard transfers to the Upper Dials directly above it, its decimal value being determined by the position of the carriage. The number of additions or subtractions in each position is recorded as the cycle count in the Lower Dials.

Because this machine is fully automatic, the operator need only enter the numbers in the machine and depress the operating key. The Friden performs all supplementary steps (dial clearance, carriage positioning, cycle count, and keyboard clearance) automatically, thereby eliminating distraction and possible source of error.

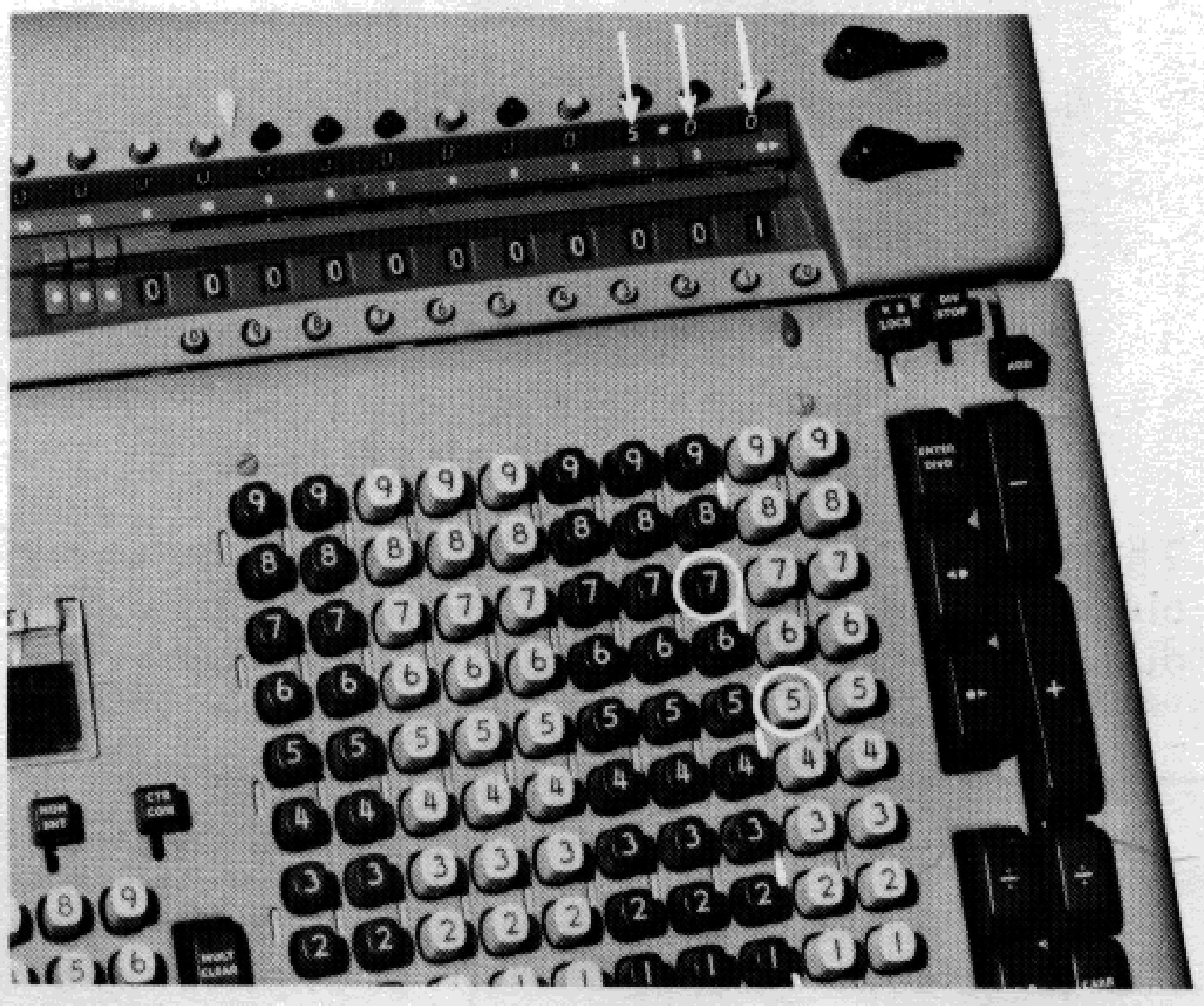
HOW TO SET IT UP

The term "program" embraces the arrangement of decimal markers and positions of the various controls to make use of specific features of particular advantage in performing typical problems. Where numbers indicate specific decimal point locations, a marker should be placed just to the left of the column or dial indicated. The count is always from the right-hand side of the machine.

HOW TO USE IT

It is assumed that, before the indicated program is set up, all dials read zero, the dial locks on the carriage lie parallel with the carriage, and no numbers are entered in the Keyboard or Multiplier. The detailed procedure for each example is obtained by performing the steps indicated on each line in the box form. Successive answers are given in the analysis to the left.

Addition and Subtraction



PLUS AND MINUS BARS

Set a number on the Keyboard; depress the Plus bar to add, or the Minus bar to subtract.

The number transfers from the Keyboard to the Upper Dial directly above it, as shown in the illustration at left.

ADD LEVER

Moving the ADD lever down gives single-cycle operation from the Plus or Minus bars, with automatic Keyboard clearance after each cycle.

EXAMPLE

5.00 + 7.50 + 6.25 - 3.95 = 14.80

5.00
+ 7.50 = 12.50
+ 6.25 = 18.75
- 3.95 = 14.80

ADD lever down	**Decimal Markers** Keyboard 2 Upper Dials 2

KEYBOARD 00 000 000.00	**MULTIPLIER** 00 000 000 00	**CONTROL**
5.00		Plus
7.50		Plus
6.25		Plus
3.95		Minus

Multiplication

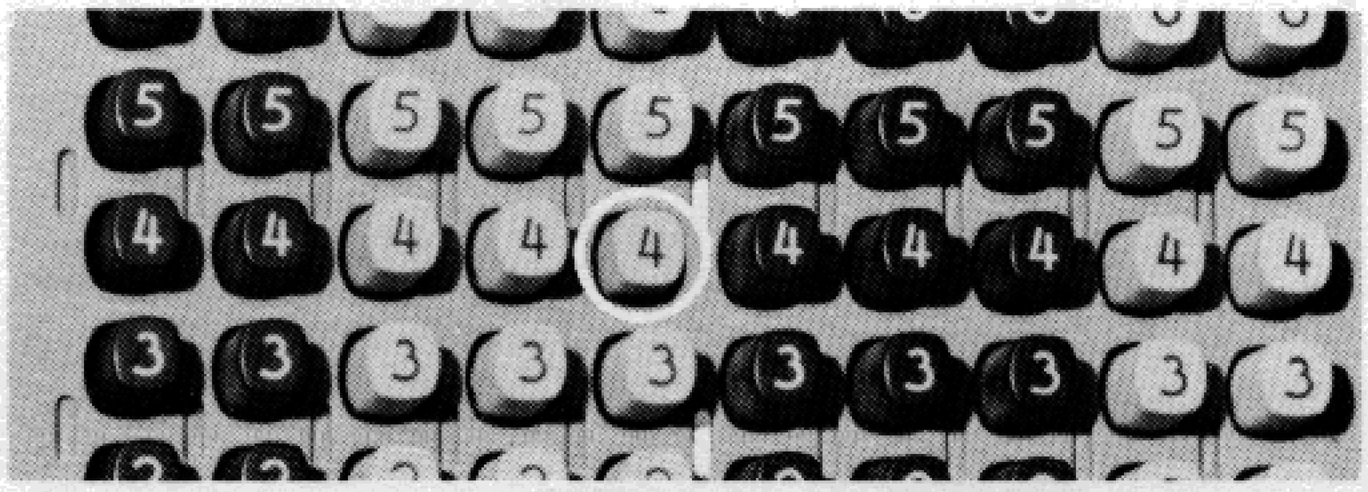
POSITIVE DECIMAL POINT CONTROL

The sum of the decimal places in both factors (Keyboard and Multiplier) equals the number of places in the product (Upper Dials).

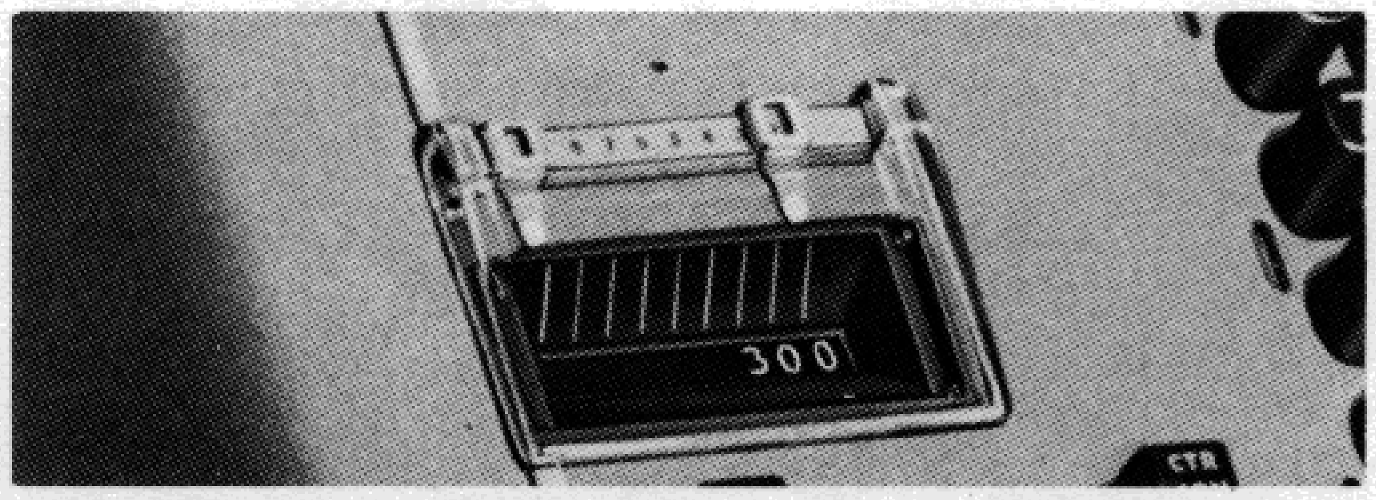
Using a "fixed decimal" program, chosen to fit the work at hand causes all products to appear at the same position. Any decimal program may be chosen which will handle the maximum number of decimals conveniently. The program suggested below will handle the majority of problems.

REGULAR MULTIPLICATION

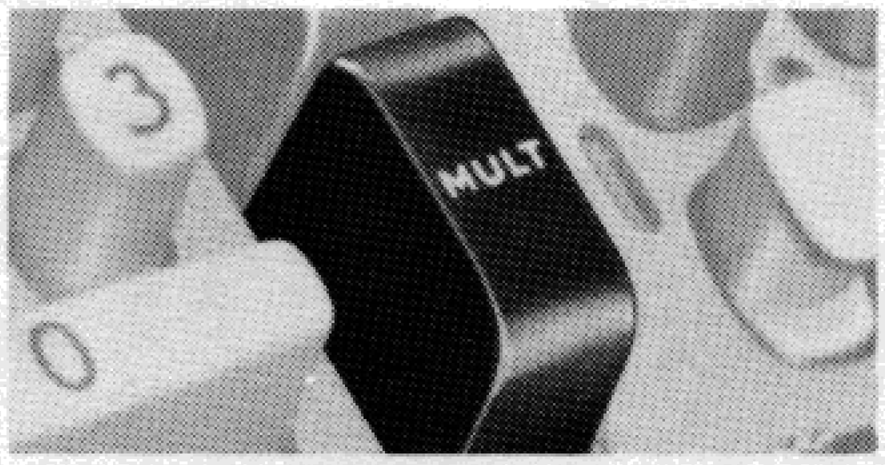
Set one factor on the Keyboard.



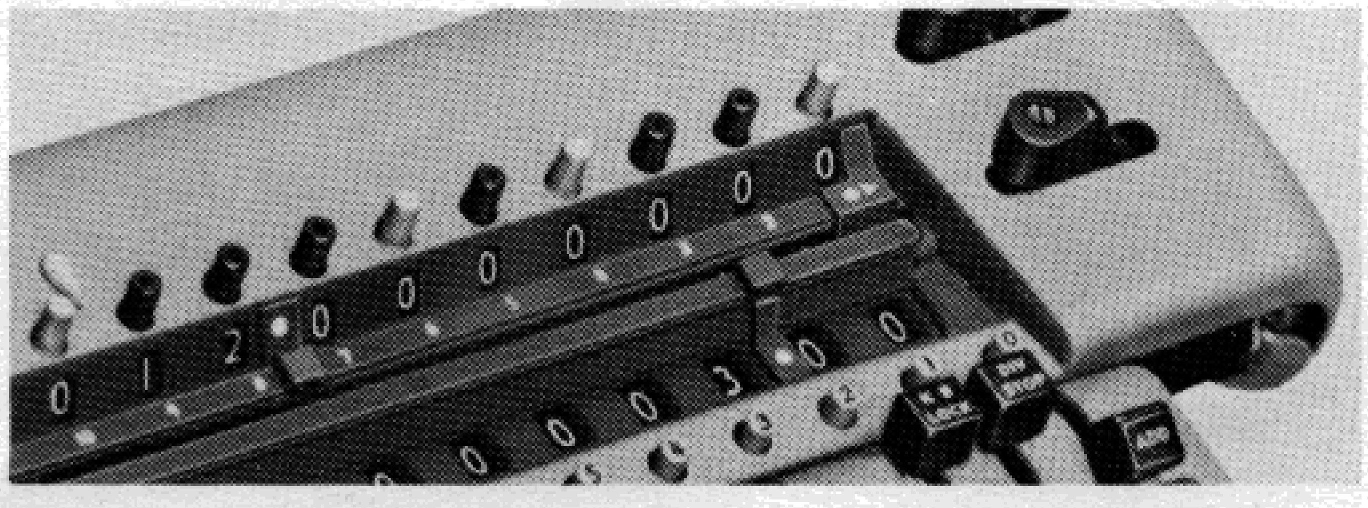
Enter the other factor in the Multiplier.



Depress the MULTIPLY key.



The product appears in the Upper Dials.



EXAMPLE

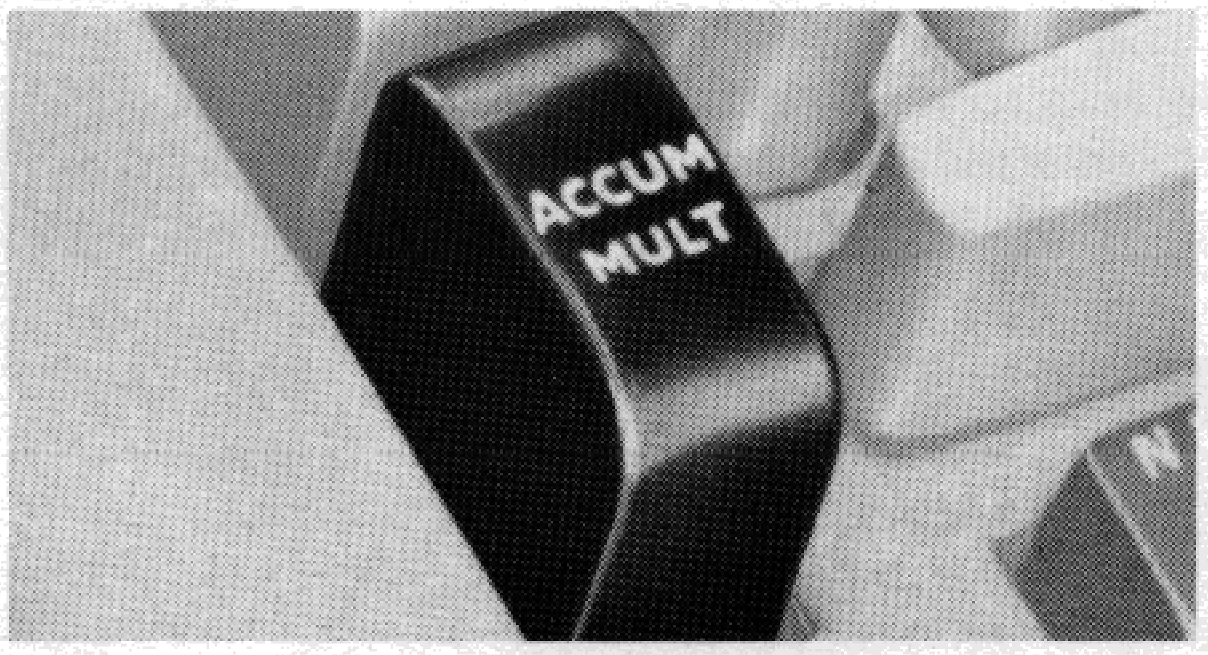
(4 x 3) + (6 x 5) - (7 x 2) = 28

4 x 3 = 12
12 + (6 x 5) = 42
42 - (7 x 2) = 28

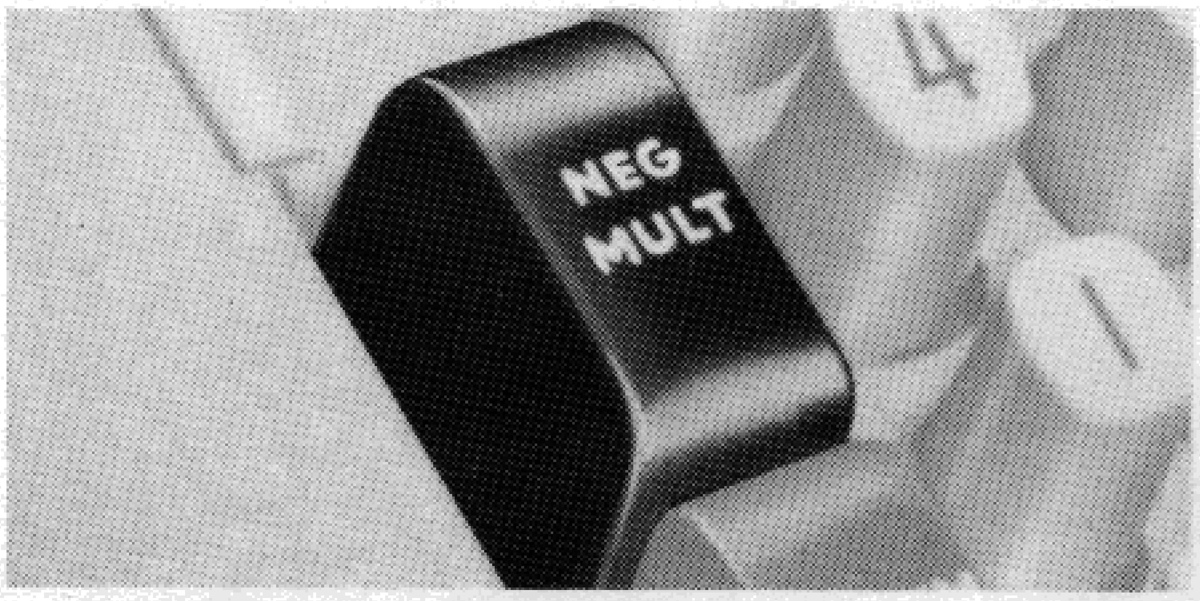
ACCUMULATIVE MULTIPLICATION

Products may be algebraically accumulated by setting the factors in the same way and using the:

ACCUMULATE-MULTIPLY key to add,



NEGATIVE-MULTIPLY key to subtract.



MULTIPLIER CLEARANCE

The MULTIPLIER CLEAR key causes instantaneous clearance of the entry in the Multiplier, without disturbing any other figures in the machine.

	Decimal Markers	
ADD lever down	Keyboard	5
	Multiplier	2
	Upper Dials	7
	Lower Dials	2

KEYBOARD 00 000.000 00	**MULTIPLIER** 00 000 000.00	**CONTROL**
4.000 00	3.00	MULT
6.000 00	5.00	ACCUM MULT
7.000 00	2.00	NEG MULT

Division

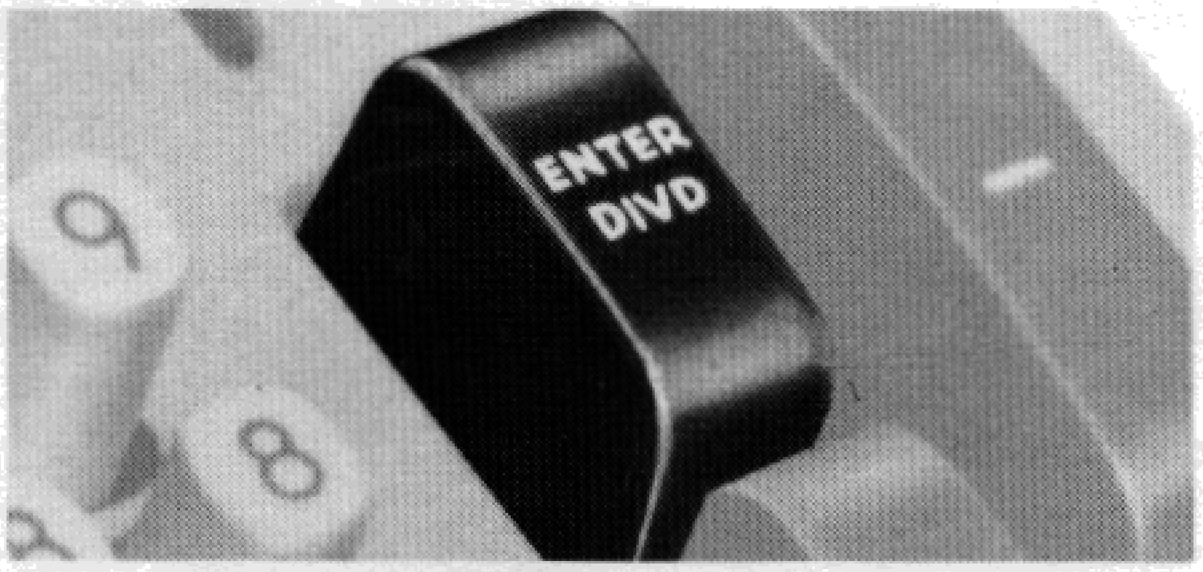
POSITIVE DECIMAL POINT CONTROL

Set a tab stop (place a decimal marker directly above it) for the number of decimal places required in the quotient.

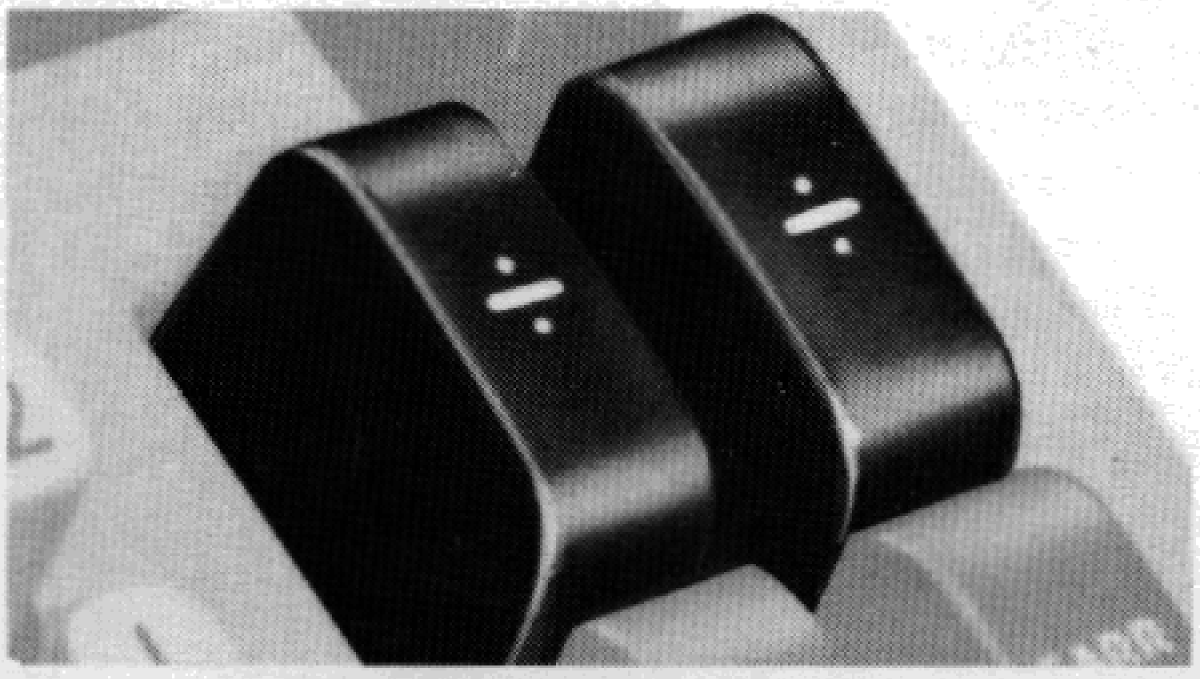
Mark a common decimal position on the Keyboard around which both the dividend and divisor may be set.

REGULAR DIVISION

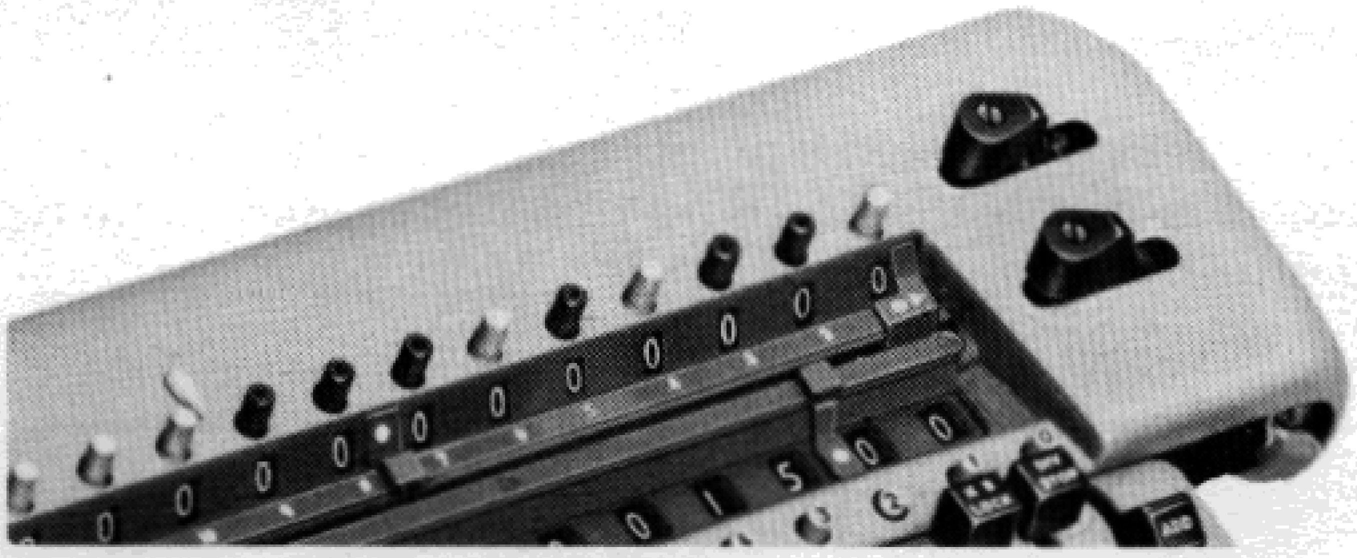
Set the dividend on the Keyboard; depress the ENTER DIVIDEND key.



Set the divisor on the Keyboard around the same decimal marker; depress both Divide keys.

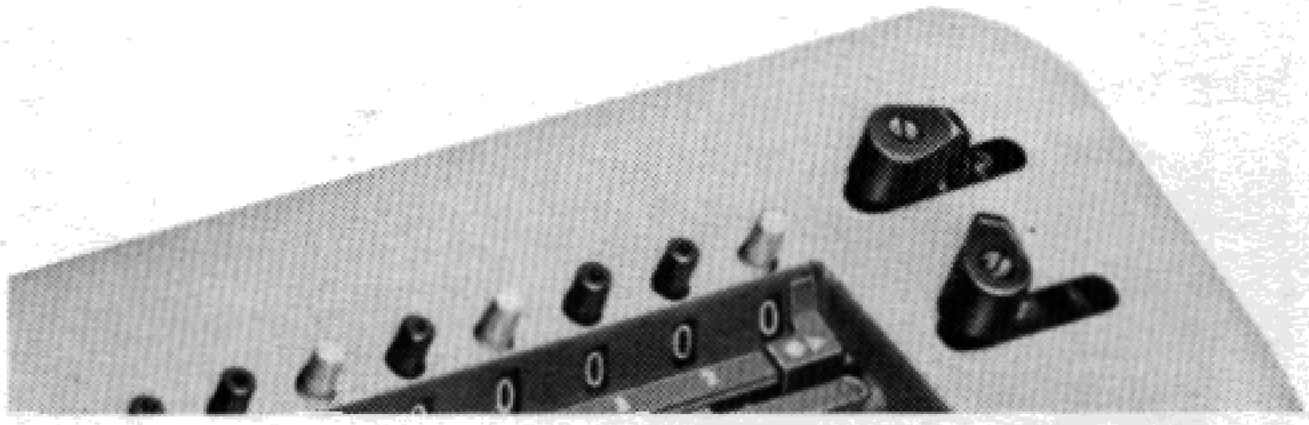


The quotient appears in the Lower Dials around the pre-determined decimal point; the remainder appears in the Upper Dials.



ACCUMULATIVE DIVISION

To accumulate quotients, lock the Lower Dials.



NEGATIVE DIVISION

Use of just the left Divide key yields a negative quotient. This provides for simultaneous subtraction of the answer from a figure in the Lower Dials, or from zero when the complement of the true answer is required. (See p. 16)

DIVISION STOP

If, after the Divide keys are depressed, the carriage shifts to the extreme right and the machine continues to cycle, either there is no divisor set on the Keyboard or the problem exceeds the capacity of the machine program. Move the DIVISION STOP lever up; then repeat the problem with a lower tab setting. Moving this lever down during a division operation causes the machine to stop after the count is completed in that position. Division may be resumed by re-depressing the Divide keys.

EXAMPLE

$$\frac{45}{3} - \frac{17.76}{3.125} = 9.32$$

$$\frac{45}{3} = 15.00$$

$$15.00 - \frac{17.76}{3.125} = 9.32$$

	Decimal Markers	
ADD lever down Set #2 tab stop	Keyboard	5
	Upper Dials	7
	Lower Dials	2

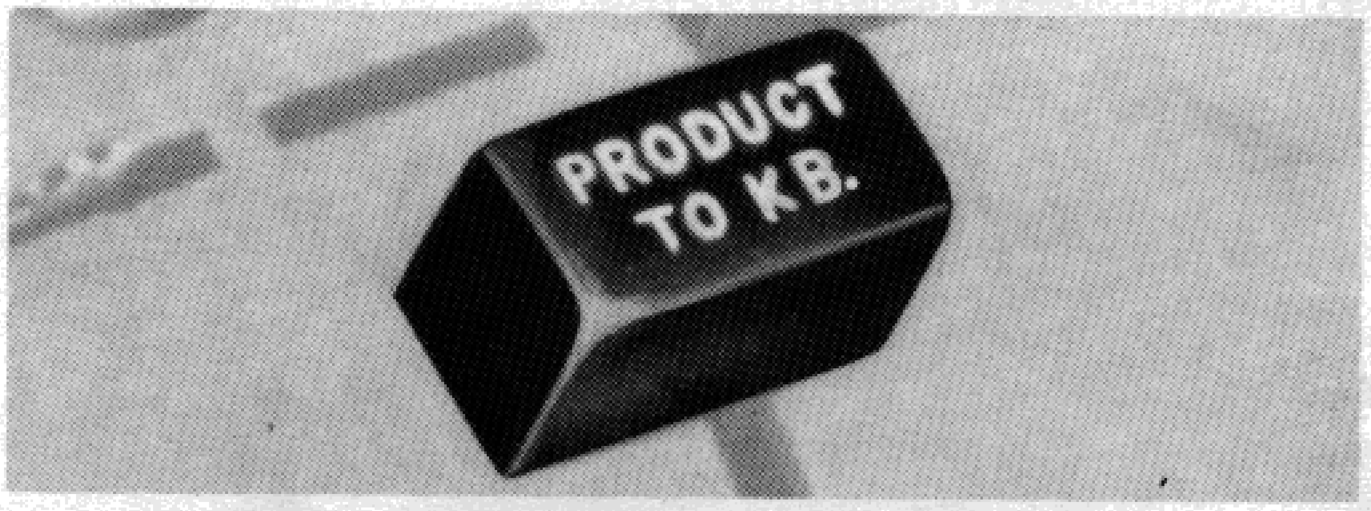
KEYBOARD 00 000.000 00	**MULTIPLIER** 00 000 000 00	**CONTROL**
45.000 00		ENTER DIVD
3.000 00		Both Divide
Lock Lower Dials		
17.760 00		ENTER DIVD
3.125 00		Left Divide

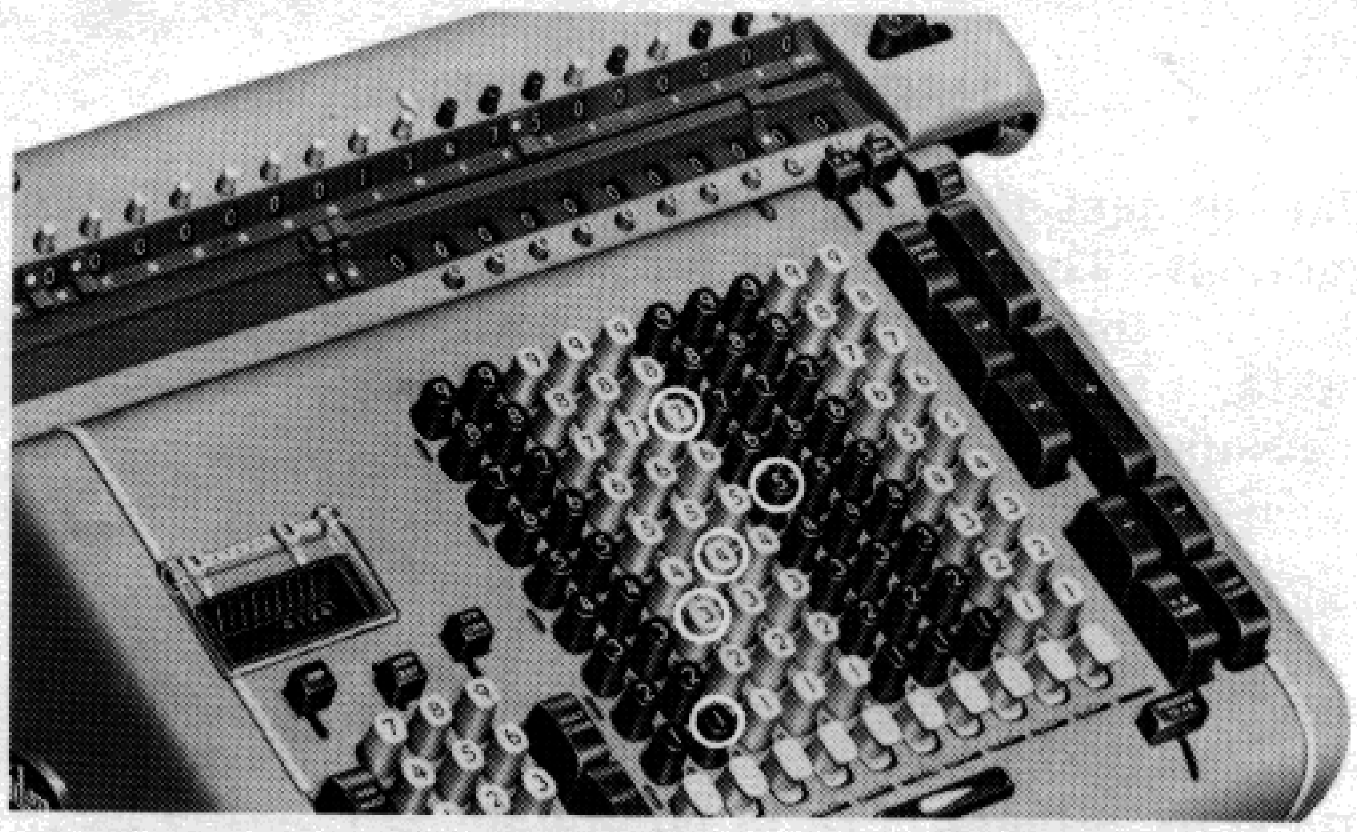
Chain Multiplication

a × b × c

"BACK TRANSFER"

A sum or product appearing in the Upper Dials may be automatically transferred to the Keyboard by moving the PRODUCT TO KEYBOARD lever down.





CHOOSING THE TAB STOP

Automatic entry at the fixed Keyboard decimal position is provided by presetting the tab stop corresponding to the difference between the number of decimals in the Upper Dials and on the Keyboard.

Tab stop = Upper Dials - Keyboard

Normally, this is the same as the decimal position in the Multiplier.

EXAMPLE

Determine the cubic yards of earth in an excavation 27' 6" wide, 49' 0" long, and 6' 9" deep.

ANALYSIS

$$\frac{27.50 \times 49.00 \times 6.75}{27.00} = 336.9 \text{ cu. yds.}$$

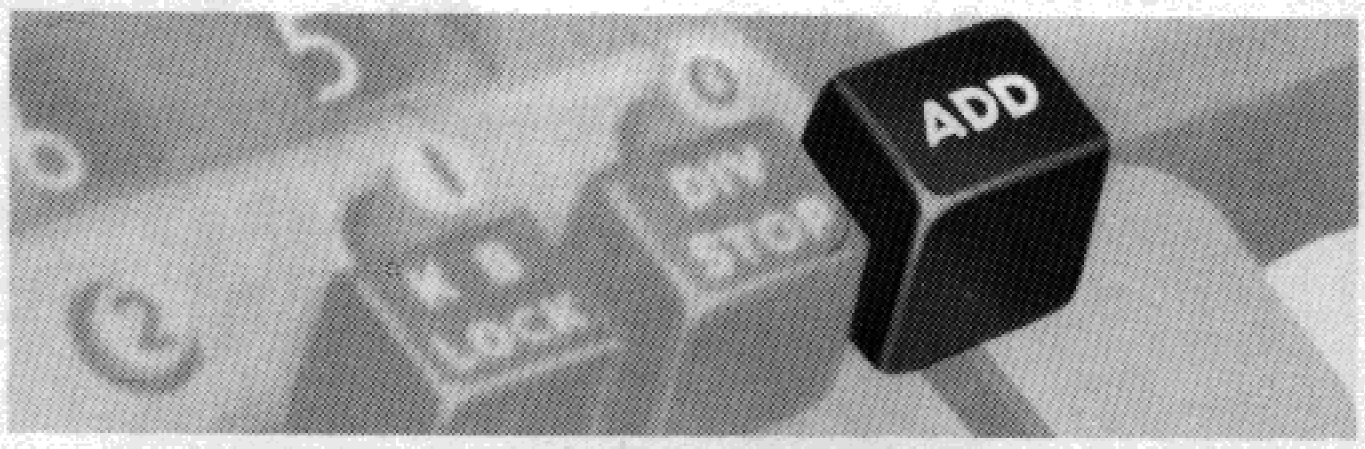
$$27.50 \times 49.00 = 1347.50$$

$$1347.50 \times 6.75 = 9095.625$$

$$9095.625 \div 27.00 = 336.87$$

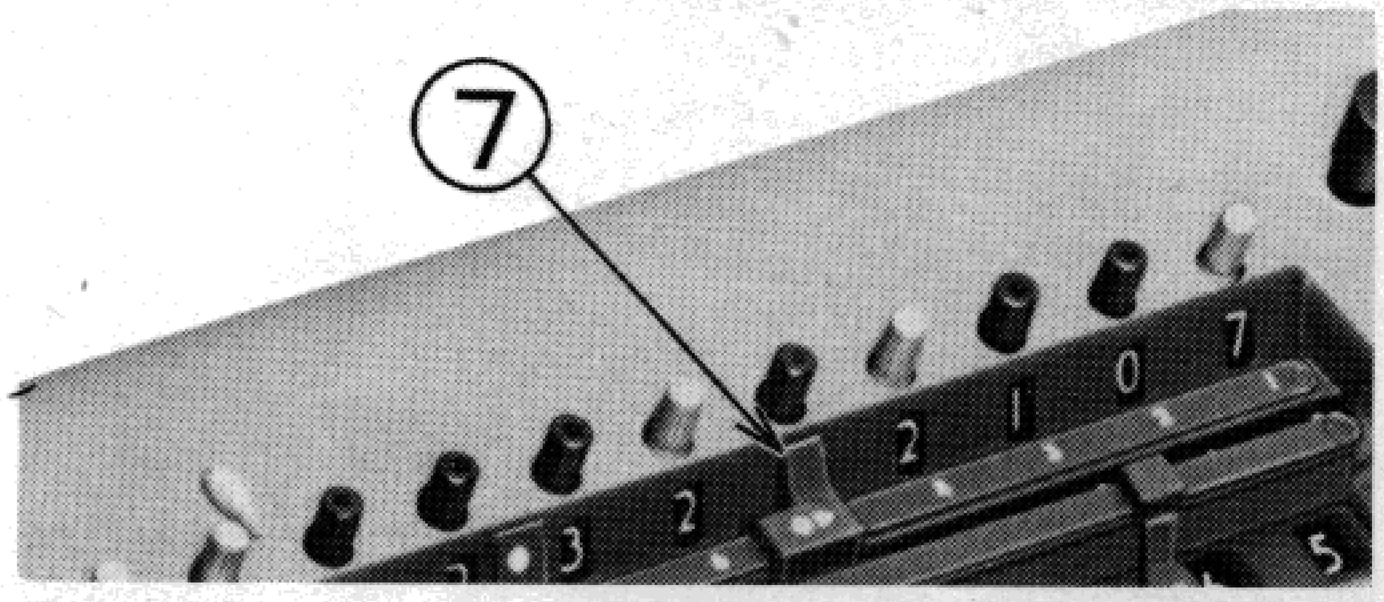
RETAINING A PRODUCT AS A CONSTANT

With the ADD lever in its upper position, the number transferred to the Keyboard will be retained as a constant until: the Keyboard is deliberately cleared (KB CLEAR key); another number is transferred in; or the ADD lever is moved down to restore automatic Keyboard clearance.



FRACTION BLOCKOUT

An unwanted fraction (e.g., a locked-in fractional cent adjustment - see Page 7) can be prevented from entering the Keyboard. Move the Fraction Blockout slide to cover the dial to the right of the last digit desired. This, and all digits to the right, will be retained in the Upper Dials.



This feature does not interfere with the normal function of the Upper Dials in addition, subtraction, multiplication, or division.

	Decimal Markers	
ADD and NON ENT down Set #2 tab stop	Keyboard	5
	Multiplier	2
	Upper Dials	7
	Lower Dials	2

KEYBOARD 00 000.000 00	MULTIPLIER 00 000 000.00	CONTROL
27.500 00	49.00	MULT PROD TO KB
(1 347.50)	6.75	MULT
27.000 00		Both Divide

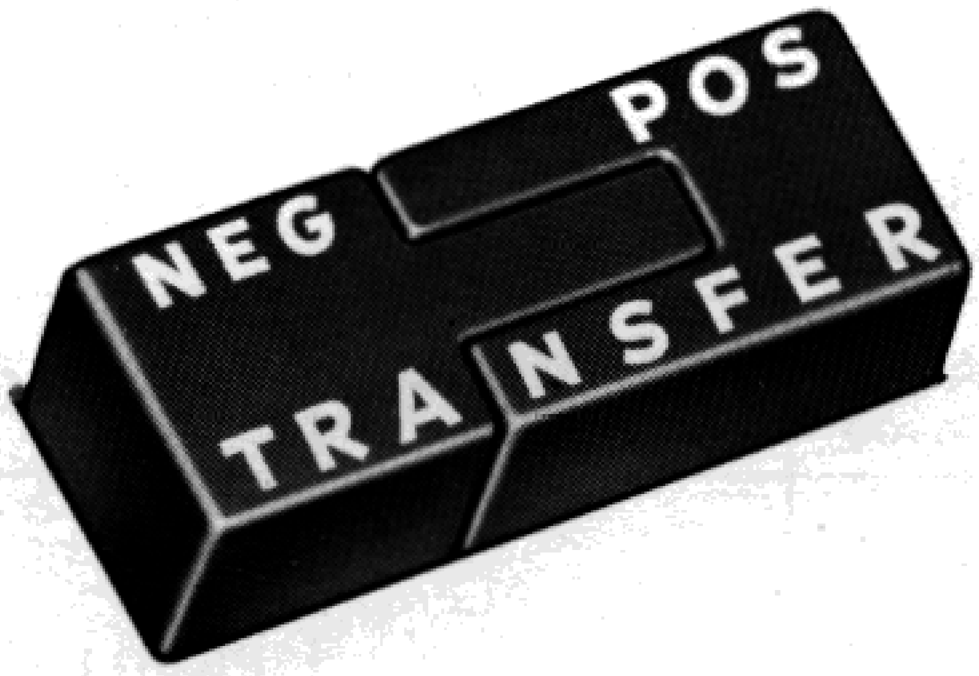
Grand Total Accumulation

THE TRANSFER KEY

Individual sums or products may be accumulated in the Lower Dials:

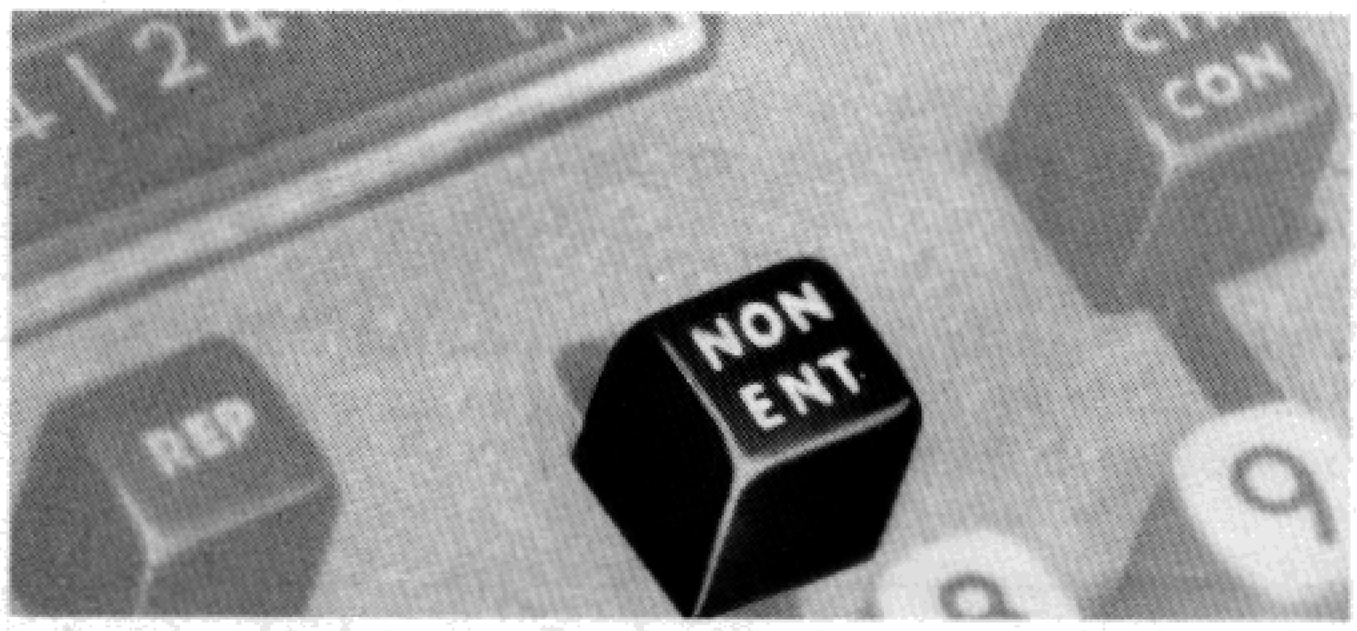
positively, by depressing both portions of the TRANSFER key;

negatively, by depressing only the left (NEG) part.



MULTIPLIER NON-ENTRY

To utilize this feature, the Non-Entry control is moved down to prevent the multipliers from affecting the accumulated total. Automatic clearance of the Lower Dials is disengaged by turning the Lower Dials Lock up.



FRACTIONAL-CENT DIALS

Six Fractional Cent dials are provided to make the Friden more flexible in its application. Identified by the black collar around the twirler knob, these dials may be set to restore to a number other than zero as follows:

Twirl the dial to the number desired.

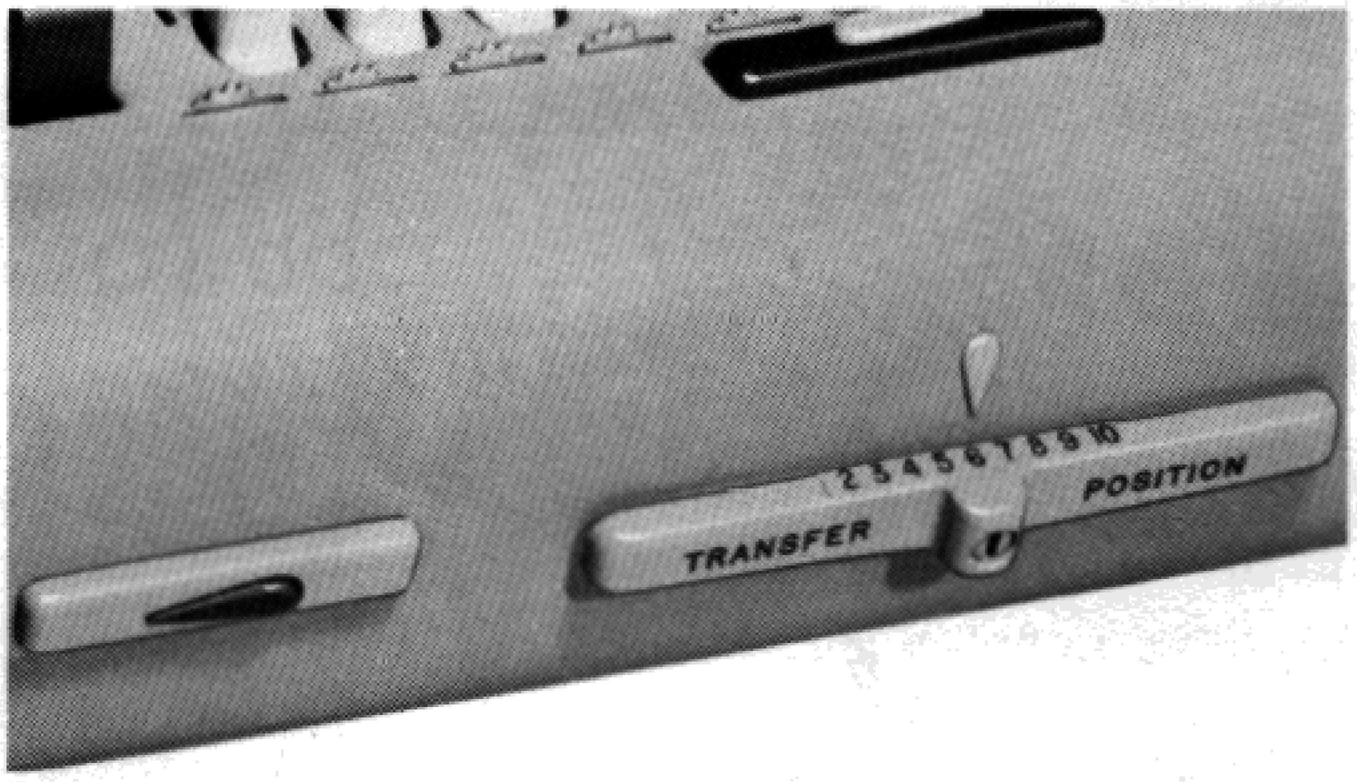
Raise the black collar and depress the CARRIAGE CLEAR key.

Release the collar, being sure that it settles into position.

Numbers other than 5 may be locked in these dials to serve as constant dividends or addends.

TRANSFER SELECTION

The TRANSFER SELECTION feature is provided to permit transfer from a range of positions in the Upper Dials. Holding the Selection Lock to the left, set the slide to agree with the Upper Dial containing the last digit to be transferred.



EXAMPLE

INVOICE

25 items @ $1.15	28.75
5 5/12 dozen @ $12.50	67.71
	96.46
Less 35%	33.76
	62.70

ADD and NON ENT down
Lock Lower Dials
Lock 5 in Dial 5 and cover
Transfer Selection at 6

Decimal Markers	
Keyboard	5
Multiplier	2
Upper Dials	7
Lower Dials	2

KEYBOARD 00 000.000 00	MULTIPLIER 00 000 000.00	CONTROL
25.000 00	1.15	MULT Both TRANSFER
5.416 67	12.50	MULT Both TRANSFER
96.46	.35	MULT NEG TRANSFER

Chain Multiplication in Billing—Conversion Factors

INTERNATIONAL EVALUATION

Many problems involving more than two factors require the first product to be adjusted to the nearest unit, and the next product to be rounded off to the nearest hundredth, or cent. Note how the half-cent locked in Upper Dial 5 accomplishes these adjustments.

EXAMPLE

With the U.S. dollar worth 12.484 Mexican pesos, determine the Mexican value of 25 items priced at (U.S.) $1.75.

ANALYSIS 12.484 x 1.75 x 25 = $546.25

- Multiply peso price by exchange rate.
  12.484 x 1.75 = 21.85
- Peso price times quantity equals total value.
  21.85 x 25 = 546.25

	Decimal Markers
ADD lever down Lock 5 in Dial 5 and cover with Fractional Blockout Set #2 tab stop	Keyboard 5 Multiplier 2 Upper Dials 7

KEYBOARD 00.000.000 00	**MULTIPLIER** 00 000 000.00	**CONTROL**
12.484 00	1.75	MULT
(21.850 00)	25.00	PROD to KB MULT

ODD-LOT EXTENSIONS

Where a large conversion factor is involved, it is normally set on the Keyboard first, to as many decimal places as required. In this instance, the fifth tab stop is used to bring the number of larger units, adjusted to the nearest fifth decimal place, to the customary Keyboard position.

This illustration also shows the application of the Friden Grand Total Accumulation feature in typical invoicing or inventory work.

EXAMPLE

127 items @ $18.50/gross = $ 16.32
39 items @ $26.33/dozen = 85.57
$ 101.89

ANALYSIS

To convert items to:	Multiply by:
Dozens	.0833333
Gross	.0069444

- Convert quantity to units used in price.
  127 x .0069444 = .88194 gr.
- Multiply this product by the price.
  .88194 x 18.50 = 16.32
- Transfer to Lower Dials for accumulation.

39 x .0833333 = 3.25000 doz.

3.25000 x 26.33 = 85.57
16.32 + 85.57 = 101.89

	Decimal Markers
ADD and NON ENT down Lock Lower Dials Lock 5 in Dial 5 and cover with Fraction Blockout Set #5 tab stop Transfer Selection at 6	Keyboard 5, 10 Multiplier 0, 2 Upper Dials 7, 10 Lower Dials 2

KEYBOARD .00 000.000 00	**MULTIPLIER** 00 000 000.00.	**CONTROL**
.00 694 44	127.	MULT
(.881 94)	18.50	PROD to KB MULT Both TRANS
.08 333 33	39.	MULT
(3.250 00)	26.33	PROD to KB MULT Both TRANS

Chain Multiplication in Billing—Decimal Prices

PRICES PER HUNDRED, STEEL

EXAMPLE

Compute the selling price of:

4 BARS, 2 x 1 x 3/16 CHANNEL, 30 FT

when 1 lineal foot weighs 2.570 lbs. and the price is $12.65/cwt.

ANALYSIS

$4 \times 30 \times 2.570 \times \frac{12.65}{100} = \$38.96$

- Compute lineal footage.
  4 x 30 = 120
- Convert to pounds.
  2.570 x 120 = 308
- Multiply by price per pound.
  .12650 x 308 = 38.96
- Transfer to Lower Dials for accumulation.

ADD and NON ENT down
Lock Lower Dials
Lock 5 in Dial 5 and
 cover with Fraction
 Blockout
Set #3 tab stop
Transfer Selection at 6

Decimal Markers	
Keyboard	2, 5
Multiplier	0, 3, 5
Upper Dials	5, 7
Lower Dials	2

KEYBOARD 00 000.000.00	**MULTIPLIER** 00 000.00.000.	**CONTROL**
30.000 00	4.	MULT PROD to KB
(120.00)	2.570	MULT PROD to KB
(308.00)	.12 650*	MULT Both TRANS

*Merely add one cipher to quoted price.

PRICES PER THOUSAND, LUMBER

EXAMPLE

Compute the selling price of:
2 x 4
245/8 63/10 287/12 @ $87.50/M

ANALYSIS

$[(245 \times 8) + (63 \times 10) + (287 \times 12)] = 6034$

$6034 \times .66667 \times \frac{87.50}{1000} = 352.01$

- Accumulate lineal footage.
  (245 x 8) + (63 x 10) + (287 x 12) = 6,034
- Convert lineal footage to board feet.
  6,034 x .66667 = 4,023
- Multiply by price per board foot.
  4,023 x .08750 = 352.01
- Transfer to Lower Dials for accumulation.

ADD and NON ENT down
Lock Lower Dials
Lock 5 in Dial 5 and
 cover with Fraction
 Blockout
Set #5 tab stop
Transfer Selection at 6

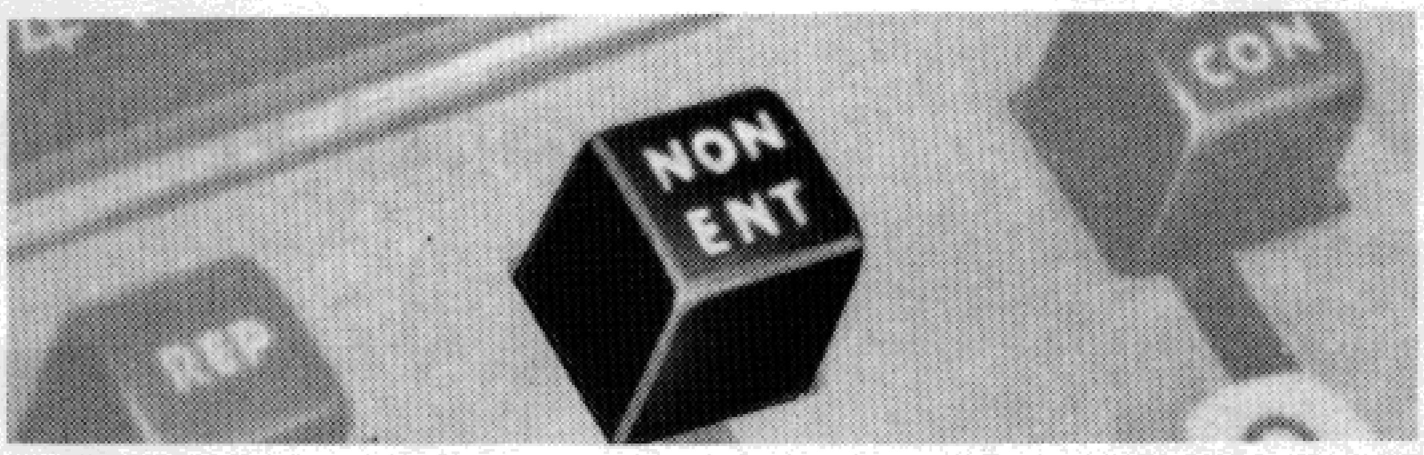
Decimal Markers	
Keyboard	0, 5
Multiplier	0, 5, 7
Upper Dials	5, 7
Lower Dials	2

KEYBOARD 00 000.00 000.	**MULTIPLIER** 000.00.000 00.	**CONTROL**
245.00 000	8.	MULT
63.	10.	ACCUM MULT
287.	12.	ACCUM MULT PROD to KB
(6 034.)	.666 67	MULT PROD to KB
(4 023.)	.08 750 00*	MULT Both TRANS

*Merely add two ciphers to quoted price.

Three-Way Counter Control

With the Non-Entry Control in its upper position, the operating cycles, whether registered from the Plus or Minus bars or the Multiplier unit, are counted in the Lower Dials. This permits an accumulation of the multiplier factors during a series of individual problems.



NORMAL COUNTING

The Three-Way Control provides extra options of great value on specific applications. With this control in its upper position (identified by the green dot appearing to the right) the count follows the direction of product dials: positive in addition; negative in subtraction.

PROGRESSIVE COUNTING

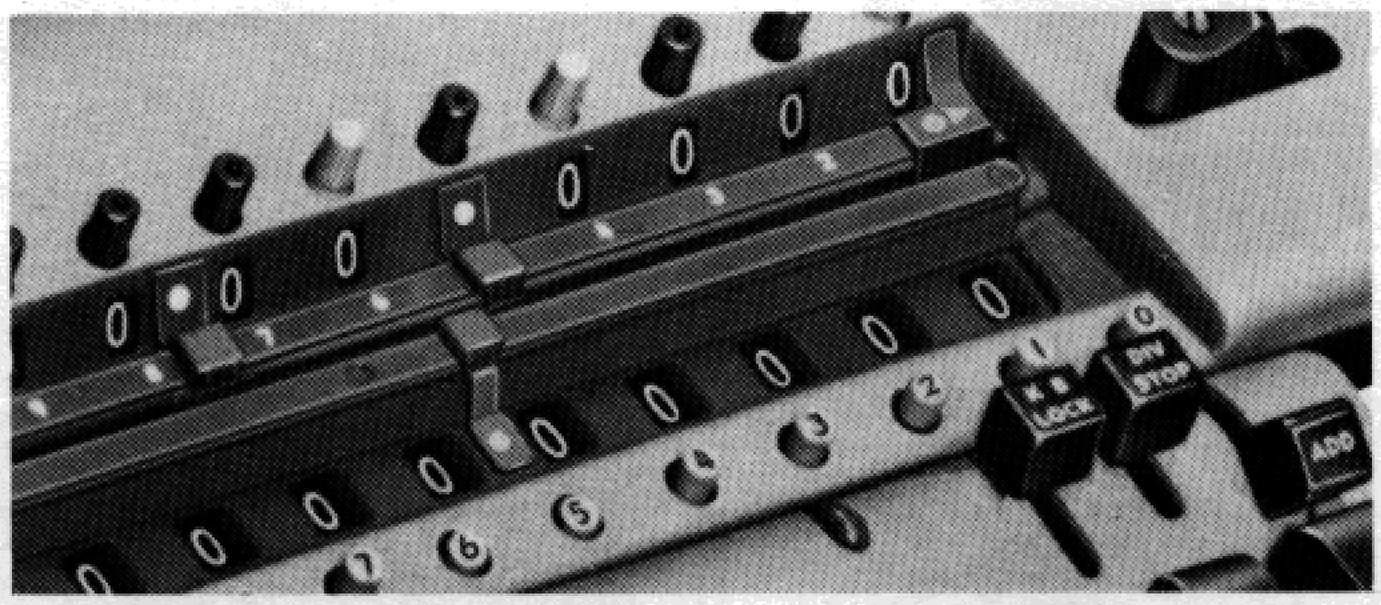
When the Counter Control is moved to its center position (identified by the white dot appearing to the right) the count is continuously positive, even though the product dials may be working in subtraction.

REVERSED COUNTING

Moving this control to its lowest position (identified by the red dot appearing to the right) causes the counter dials to work in reverse direction, relative to the product dials. Positive cycles are counted negatively, and vice versa.

(The Progressive and Reversed options are further illustrated on Page 11.)

Selective Division Stop



This exclusive Friden feature permits automatic interruption or termination of a division operation at a selected digit, short of the usual first counter dial. It is engaged by depressing the tab stop on both sides of the dial in which the last desired digit will be produced.

For instance, grain dealers buy in pounds at a price based on the bushel. Odd pounds are expressed as such, rather than as a decimal part of a bushel. Stopping the division at the units digit gives an answer in whole bushels with odd pounds showing as the remainder in the Upper Dials. Resuming the division converts this remainder to a decimal fraction for multiplication by the bushel price.

EXAMPLE

34,567 lbs. of wheat @ \$1.85/bu. = \$1,065.82
(1 bushel of wheat weighs 60 pounds.)

34,567 ÷ 60 = 576 7/60 bu.

576 7/60 = 576.11666 bu.
576.11666 x 1.85 = 1,065.82

	Decimal Markers	
ADD and NON ENT down Set #5 and #6 tab stops Lock 5 in Dial 5 and cover	Keyboard Multiplier Upper Dials Lower Dials	5 2 7, 10 5

KEYBOARD 00 000.000 00	**MULTIPLIER** 00 000 000.00	**CONTROL**
34 567.000 00		ENTER DIVD
60.		Both Divide
Record quotient and remainder		
Resume division		Both Divide
576.116 66	1.85	MULT

Reversed Cycle Count—SQUARE ROOT EXTRACTION

EXAMPLE

$\sqrt{639.} = 25.278\ 449\ 31$

Multiplying the radicand first by 5 permits extraction of the root by subtracting successive odd multiples of 5. The number of such subtractions is the desired square root.

Set the radicand on the left of the Keyboard with its decimal point coinciding with one of the exposed markers. Multiply by 5.000 000 000.

5 x 639 = 3195.00

Starting in the ninth column of the Keyboard:

(1) Set 5 on the Keyboard and subtract.
(2) Raise the Keyboard setting to the next odd multiple of 5 (3 x 5 = 15) and subtract.
(3) Subtract odd multiples of 5 until an overdraft occurs.
(4) Depress the Plus bar to restore a positive remainder.
(5) Move only the 5 one column to the right on the Keyboard. Shift the carriage one position to the left.

*Repeat steps (1) through (5) to completion of the problem. The root appears in the Lower Dials and on the Keyboard.

	Decimal Markers
ADD, DIV STOP and CTR CON down Set #9 tab stop	Keyboard 2, 4, 6, 8, 10 Multiplier 9 Upper Dials 11, 13, 15, 17

REDUCTION	**ROOT**	**KEYBOARD** 00.00.00.00.00.	**MULTIPLIER** 0.000 000 000	**CONTROL**
31 95.00		6 39.00 00 00	5.000 000 000	MULT
		Hand clear Lower Dials		KB CLEAR
- 5 00.00	1	5.		Minus
26 95.00				
-15 00.00	2	15.		Minus
11 95.00				
-25 00.00	3	25.		Minus
986 95.00				
+25 00.00	2	25.		Plus
11 95.00				
		20.5		Left Shift
- 2 05.00*	21			Minus
9 90.00				
- 2 15.00	22	21.5		Minus
7 75.00				
- 2 25.00	23	22.5		Minus
5 50.00				
- 2 35.00	24	23.5		Minus
3 15.00				
- 2 45.00	25	24.5		Minus
70.00				Etc., then
- 25.05	251	25.05		Minus
etc.				

Progressive Cycle Count—AVERAGE OF PLUS AND MINUS VALUES

EXAMPLE

Find the average of the following values of X:
763, 125, -626, 154, -138, 125, -553, 896

$\Sigma X = 746 \qquad \bar{X} = \frac{746}{8} = 93.25$
$N = 8$

- Clear and position carriage.

- Add or subtract values of X as indicated.

ΣX = 746 in Upper Dials
N = 8 in Lower Dials

- Divide ΣX by N. $\frac{746}{8} = 93.25000$

	Decimal Markers
ADD lever down CTR CON at middle position Set #5 tab stop	Keyboard 2 Upper Dials 7 Lower Dials 5

KEYBOARD 00 000 000.00	**MULTIPLIER** 00 000 000 00	**CONTROL**
		ENTER DIVD
763.00		Plus
125.		Plus
626.		Minus
154.		Plus
138.		Minus
125.		Plus
553.		Minus
896.		Plus
Hand clear Lower Dials		
8.		Both Divide

Flexible Keyboard

COMPOUND ADDITION AND REDUCTION TO LOWEST TERMS

EXAMPLE

Add the following amounts in pounds Sterling and reduce to lowest terms:

£25. 3.11
- £ 3.17. 2
- £ 2.19. 5
+ £ 6. 1.10
- £ 1.18. 1
£22.11. 1

1 £ = 20 shillings (s). The complement of 020 is 980.

1 s = 12 pence (d). The complement of 012 is 988.

Mark off the Keyboard into separate areas for each denomination, placing the larger denominations to the left. Add or subtract all denominations for each value in one operation.

To reduce to lowest terms, add the complement of that denomination until the total for that denomination is less than the equivalent of 1 larger unit. If part of the total is negative*, subtract that complement until the 9's disappear. In the example below, the "9" in the shillings answer indicates "minus 50" shillings.

- Perform the addition and subtraction indicated.
  Total 24.950*013.
- Convert excess pence to shillings. + 988.
  24.951.001.
- Convert shilling overdraft to pounds. - 980.000.
  23.971.001.
  - 980.000.
  22.991.001.
  - 980.000.
  22.011.001.

*Indicated by a 9 to the left of that answer.

	Decimal Markers
ADD lever down	Keyboard 0, 3, 6 Upper Dials 0, 3, 6

KEYBOARD 0 000.000.000.	MULTIPLIER 00 000 000 00	CONTROL
25.003.011.		Plus
3. 17. 2.		Minus
2. 19. 5.		Minus
6. 1. 10.		Plus
1. 18. 1.		Minus
DIV STOP down		
988.		Plus
		KB CLEAR
980.000.		Minus
"		Minus
"		Minus

CONVERSION OF NEGATIVE ANSWERS TO POSITIVE FORM

EXAMPLE

2146.38
-4705.29
-2558.91

- Perform subtraction as indicated:
  2146.38 - 4705.29 = ...9997441.09
- Copy overdraft to Keyboard and subtract twice.
  -9997441.09
  0000000.00
  -9997441.09
  2558.91

	Decimal Markers
ADD lever down Set #0 tab stop	Keyboard 2 Upper Dials 2

KEYBOARD 00 000 000.00	MULTIPLIER 00 000 000 00	CONTROL
2 146.38		ENTER DIVD
4 705.29		Minus
Move DIV STOP down		
9 997 441.09		Minus
"		Minus

Individual Column Locks

A number may be locked on part of the Keyboard simply by raising the individual column locks at the base of the columns used. To unlock the columns, merely depress the individual column locks.

PRODUCTS DIVIDED BY A CONSTANT

With the Counter Control down, the multiplier registers negatively in the counter dials. This negative value exactly offsets the excess quotient resulting from retaining the constant on the Keyboard during the multiplication.

EXAMPLE

Compute the acreage in the following:
(1 Acre = 43,560 Sq. Ft.)

Lot No.	Size in Feet	Acres
1	85.0 x 120.4	.235
2	88.5 x 122.6	.249
3	91.3 x 124.3	.261
4	87.0 x 115.6	.231

- Lock the constant divisor on the right side of the Keyboard.
- Set the multiplicand just left of the constant and multiply by the other factor.
- Depress either the left or both Divide keys.

(120.4 x 85.0) ÷ 43560 = .2349403
(122.6 x 88.5) ÷ " = .2490840
(124.3 x 91.3) ÷ " = .2605277
(115.6 x 87.0) ÷ " = .2308815

	Decimal Markers
ADD and CTR CON down	Keyboard 0, 6 Multiplier 1 Upper Dials 7 Lower Dials 7

KEYBOARD 0 000.000 000.	**MULTIPLIER** 000 000 000.0	**CONTROL**
43 560.		
Raise column locks		
120.4(43560)	85.0	MULT
"		Both Divide
122.6 "	88.5	MULT
"		Both Divide
124.3 "	91.3	MULT
"		Both Divide
115.6 "	87.0	MULT
"		Both Divide

PERCENT ANALYSIS (CONSTANT DIVISOR METHOD)

EXAMPLE

Determine the percent of total sales for each department.

Dept.	Sales	Percent
1	$ 3,964.00	8.81
2	21,635.00	48.11
3	13,736.00	30.55
4	5,633.00	12.53
	$44,968.00	100.00

- Lock the total sales, as a constant divisor, on the right of the Keyboard.
- Set each variable (Dept. Sales figure) on the left of the Keyboard and depress the Enter Dividend, Minus, and both Divide controls in that order.
- Individual percentages appear in the Lower Dials. Remainders are accumulated in the Upper Dials, causing the sum of the percentages to be automatically adjusted exactly to 100.00%. This is verified by the restoration of zeros in the Upper Dials after the last division.

Selective Division Stop is used to limit the percentages to the desired accuracy.

	Decimal Markers
ADD and NON ENT down Lock Right Upper Dials Set #0, #1 and #2 tab stops	Keyboard 0, 5 Upper Dials 5 Lower Dials 3

KEYBOARD 00 000.00 000.	**MULTIPLIER** 00 000 000 00	**CONTROL**
44 968.		
Raise column locks		
3 964. (44968)		ENTER DIVD
"		Minus
"		Both Divide
21 635. "		ENTER DIVD
"		Minus
"		Both Divide
13 736. "		ENTER DIVD
"		Minus
"		Both Divide
5 633. "		ENTER DIVD
"		Minus
"		Both Divide

Split Dial Clearance

Optional clearance of either side of the Upper Dials permits individual answers at one position while the other side is used for accumulation. The split dial clearance indicator is located between the ninth and tenth Upper Dials. Turning up either Upper Dials Lock disengages automatic clearance from the dials to that side of the split. When both are turned up, the left side may be cleared by turning that lock down, then depressing any control key which normally gives automatic clearance. The right side may be cleared manually by sliding the knob to the right.

DUAL MULTIPLICATION

EXAMPLE

With butterfat purchased for 89¢ per pound, compute the individual and total payments due the following producers.

Producer	Lbs. Butterfat	Payment
Smith	247.3	$220.10
Jones	163.5	145.52
Brown	314.6	279.99
Green	151.8	135.10
	877.2	$780.71

- Set the price on the Keyboard at decimal positions 2 and 9. Move the Keyboard Lock down.
- Multiply by the pounds for each producer. Individual payments appear in the Right Upper Dials and the accumulated payments in the Left. Both products are adjusted to the nearest cent. The total pounds are accumulated in the Lower Dials.

	Decimal Markers	
ADD lever down Lock Lower and Left Upper Dials Lock 5's in dials 2 and 9 and cover	Keyboard Multiplier Upper Dials Lower Dials	2, 9 2 4, 11 2

KEYBOARD 0.0000 000.00	MULTIPLIER 00 000 000.00	CONTROL
.89 .89		KB Lock down
" "	247.30	MULT
" "	163.50	MULT
" "	314.60	MULT
" "	151.80	MULT

PRO-RATA DISTRIBUTION

EXAMPLE

Distribute the heating cost of $2,478.39 to the four departments on the basis of floor area.

Dept.	Area in Sq. Ft.	Share
A	24,573	$ 495.11
B	19,468	392.26
C	37,892	763.48
D	41,071	827.54
	123,004	$2,478.39

- Determine the cost per square foot.
  2478.39 ÷ 123,004 = .020148856
- Multiply this cost by area of each department.

24,573 x .020148856 = 495.11
19,468 x " = 392.26
37,892 x " = 763.48
41,071 x " = 827.54
123,004 $2,478.39

Retaining the remainder from the initial division in the Right Upper Dials causes automatic adjustment of individual shares to the exact total. Accumulation of the multipliers in the Lower Dials proves accuracy of the work.

	Decimal Markers	
ADD lever down Lock Right Upper Dials Cover Upper Dial 9 Set #9 tab stop	Keyboard Multiplier Upper Dials Lower Dials	2, 9 2 11 2, 9

KEYBOARD 0.0000 000.00	MULTIPLIER 00 000 000.00	CONTROL
2 478.39		ENTER DIVD
123 004.00		Both Divide
.0201 488 56		KB Lock down
Clear and Lock Lower Dials		
"	24 573.00	MULT
"	19 468.00	MULT
"	37 892.00	MULT
"	41 071.00	MULT

Percent Analysis of Income Statement—Reciprocal Method

ABC COMPANY Income Statement, January

			Percent	
Gross Sales		$99,628.84		
Less Returned Sales and Allowances		1,152.61		
Net Sales		$98,476.23		100.00
Less Cost of Goods Sold		61,328.15		62.27
Gross Profit		$37,148.08		37.73
Less Sales Expenses				
Advertising	$ 8,142.09		8.27	
Wages	11,241.34		11.42	
Occupancy	6,022.80	25,406.23	6.11	25.80
		$11,741.85		11.93
Less General Expenses				
Taxes	$ 2,507.14		2.55	
Bad Debts (Recovery)	(823.19)		(.84)	
General Overhead	5,159.29	6,843.24	5.24	6.95
Net Profit		$ 4,898.61		4.98

EXAMPLE

Determine the percentages shown on the above Income Statement.

(1) Determine the reciprocal of the base (Net Sales), using 100% instead of 1 to give answers directly in percentages.
100.00 + 98,476.23 = .001015473

(2) Multiply this reciprocal by each individual item included in the base figure.
61,328.15 x .001015473 = 62.27%
8,142.09 x " = 8.27%
11,241.34 x " = 11.42%
6,022.80 x " = 6.11%
2,507.14 x " = 2.55%
(823.19) x " = (0.84)%
5,159.29 x " = 5.24%
4,898.61 x " = 4.98%
$98,476.23 100.00% *

(3) Restore Lower and Right Upper Dials to condition following Step (1).

(4) Obtain percent subtotals by multiplying by dollar subtotals given.
61,328.15 x .001015473 = 62.27%
25,406.23 x " = 25.80%
6,843.24 x " = 6.95%
4,898.61 x " = 4.98%
$98,476.23 100.00% *

	Decimal Markers
ADD lever down	Keyboard 2, 9
Lock Right Upper Dials	Multiplier 2
Set #9 tab stop	Upper Dials 11
Cover Upper Dial 9	Lower Dials 2, 9

KEYBOARD 0.0000 000.00	MULTIPLIER 00 000 000.000	CONTROL
100.00		ENTER DIVD
98 476.23		Both Divide
.0010 154.73		KB LOCK down
Clear and Lock Lower Dials		
"	61 328.15	MULT
"	8 142.09	MULT
"	11 241.34	MULT
"	6 022.80	MULT
"	2 507.14	MULT
	823.19	
" Move REP down	"	NEG MULT
"	"	MULT
"	"	NEG MULT
Move REP up		MULT CLEAR
"	5 159.29	MULT
"	4 898.61	MULT
"	98 476.23	NEG MULT
"	61 328.15	MULT
"	25 406.23	MULT
"	6 843.24	MULT
"	4 898.61	MULT

* Indicated by appearance of all zeros in Right Upper Dials.

Positive or Negative Division

PERCENT INCREASE OR DECREASE

MARKON PERCENT

EXAMPLE

[A] Determine percent of change in the following:

Dept.	Last Year	This Year	% ±
102	$85,418.00	$97,463.00	14.10+
103	$47,532.00	$41,388.00	12.93-

Ⓑ Determine the gross profit percentage on an item costing $9.87 and selling for $13.95.
Answer: 29.25%

[A] Percent Increase or Decrease.

- Divide the current figure by the previous.
  For an increase, use both Divide keys.
  For a decrease, use the left Divide key.

97,463. ÷ 85,418. = 1.14101 or 14.10%+
-(41,388. ÷ 47,532.) = ...99.12927 or 12.93%-

Ⓑ Markon Percent.

- Divide the cost by the selling price, using the left Divide key. The percentage appears to the right of the 9's in the Lower Dials.

	Decimal Markers
ADD lever down Set #5 tab stop	Keyboard 2 Upper Dials 7 Lower Dials 3

KEYBOARD 00 000 000.00	MULTIPLIER 00 000 000 00	CONTROL
97 463.00		ENTER DIVD
85 418.00		Both Divide
41 388.00		ENTER DIVD
47 532.00		Left Divide
9.87		ENTER DIVD
13.95		Left Divide

AMOUNT AND PERCENT OF INCREASE OR DECREASE

EXAMPLE

Determine the amount and percent of change in the following:

			CHANGE		
Dept.	Last Year	This Year	Dollars	±	%
102	$85,418.	$97,463.	$12,045.	+	14.10
103	$47,532.	$41,388.	$ 6,144.	-	12.93

Increases:

- Enter current figure with ENTER DIVD key.
- Holding the previous figure on the keyboard with the ADD and DIV STOP levers down:
  Subtract to determine the dollar increase;
  97,463. - 85,418. = 12,045.

Depress both Divide keys to determine its percentage.
12,045. ÷ 85,418. = .14101 or 14.10%

Decreases:

- Enter the current figure as a negative value.
- Holding the previous figure on the Keyboard:
  Add to determine the dollar decrease;
  -41,388. + 47,532. = 6,144.

Depress both Divide keys to determine its percentage. 6,144. ÷ 47,532. = .12926 or 12.93%

	Decimal Markers
ADD and NON ENT down Set #5 tab stop	Keyboard 2 Upper Dials 7 Lower Dials 3

KEYBOARD 00 000 000.00	MULTIPLIER 00 000 000 00	CONTROL
97 463.00		ENTER DIVD DIV STOP down
85 418.00 "		Minus Both Divide
41 388.00		ENTER DIVD Minus DIV STOP down
47 532.00 "		Plus Both Divide

DECIMAL EQUIVALENTS OF COMMON FRACTIONS

COMMON FRACTIONS							DECIMAL EQUIVALENTS			
3rds	4ths	6ths	8ths	12ths	16ths	32nds		64ths		
									1	.015625
						1	.031250	2	3	.046875
					1	2	.062500	4	5	.078125
				1			.083333			
						3	.093750	6	7	.109375
			1		2	4	.125000	8	9	.140625
						5	.156250	10		
		1		2			.166667		11	.171875
					3	6	.187500	12	13	.203125
						7	.218750	14	15	.234375
	1		2	3	4	8	.250000	16	17	.265625
						9	.281250	18	19	.296875
					5	10	.312500	20	21	.328125
1		2		4			.333333			
						11	.343750	22	23	.359375
			3		6	12	.375000	24	25	.390625
						13	.406250	26		
				5			.416667		27	.421875
					7	14	.437500	28	29	.453125
						15	.468750	30	31	.484375
	2	3	4	6	8	16	.500000	32	33	.515625
						17	.531250	34	35	.546875
					9	18	.562500	36	37	.578125
				7			.583333			
						19	.593750	38	39	.609375
			5		10	20	.625000	40	41	.640625
						21	.656250	42		
2		4		8			.666667		43	.671875
					11	22	.687500	44	45	.703125
						23	.718750	46	47	.734375
	3		6	9	12	24	.750000	48	49	.765625
						25	.781250	50	51	.796875
					13	26	.812500	52	53	.828125
		5		10			.833333			
						27	.843750	54	55	.859375
			7		14	28	.875000	56	57	.890625
						29	.906250	58		
				11			.916667		59	.921875
					15	30	.937500	60	61	.953125
						31	.968750	62	63	.984375

NOTE: When a continuing decimal (thirds, sixths, twelfths, etc.) is used as a factor in multiplication, it should be expressed to one more place than the number of significant digits in the other factor.

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